US009247056B2

(12) **United States Patent**
Mandalia et al.

(10) **Patent No.: US 9,247,056 B2**
(45) **Date of Patent: Jan. 26, 2016**

(54) **IDENTIFYING CONTACT CENTER AGENTS BASED UPON BIOMETRIC CHARACTERISTICS OF AN AGENT'S SPEECH**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2175 days.

(21) Appl. No.: **11/680,908**

(22) Filed: **Mar. 1, 2007**

(65) **Prior Publication Data**

US 2008/0205624 A1 Aug. 28, 2008

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/680,304, filed on Feb. 28, 2007.

(51) **Int. Cl.**
H04M 1/64 (2006.01)
H04M 3/51 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04M 3/51*** (2013.01); ***G10L 17/00*** (2013.01); *H04M 2201/41* (2013.01)

(58) **Field of Classification Search**
CPC H04M 2203/6018; H04M 3/2218; H04M 3/42068; H04M 3/42102; H04M 3/42365; H04M 3/5232
USPC 379/265.01–265.14, 266.01–266.04, 379/88.01–88.19
See application file for complete search history.

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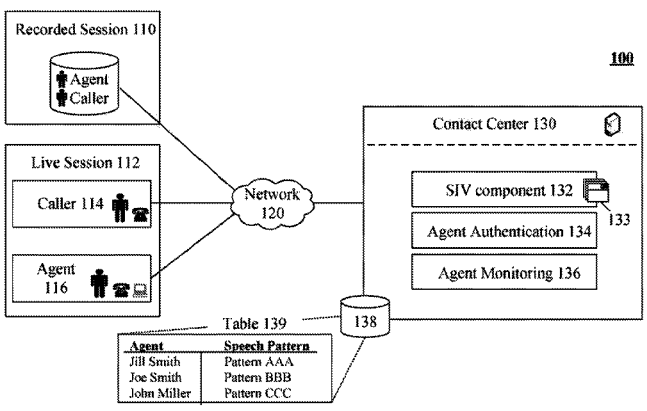
(57) **ABSTRACT**

The present invention discloses a contact center with speaker identification and verification (SIV) capabilities. In the invention, a set of contact center components can provide automated interactive communications with callers, can provide queue management for callers waiting to communicate with live agents, and can provide skills based routing for assigning live agents to callers. The SIV component can analyze speech utterances to determine a speaker identify based upon biometric characteristics of the analyzed speech utterances. Additionally, the SIV component can process speech from contact center sessions. In one embodiment, the SIV component can prevent agent substitutions from occurring of which the call center is unaware. The SIV component can also be used to distinguish whether communication session content was spoken by a contact center agent or a caller.

20 Claims, 3 Drawing Sheets



(51) **Int. Cl.**

G10L 17/00	(2013.01)
H04M 3/00	(2006.01)

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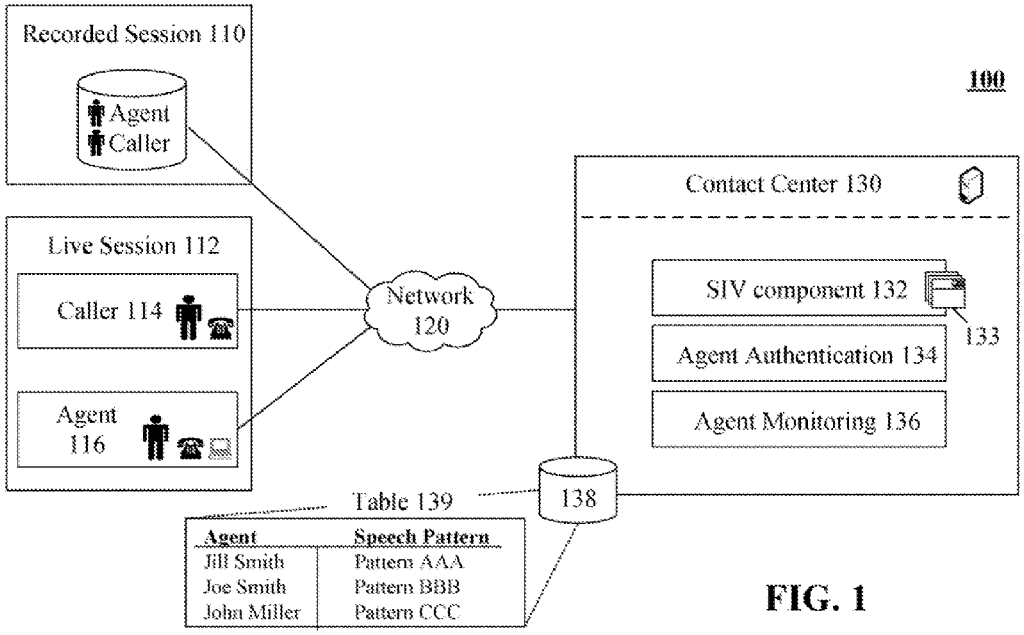
Recorded Session 110
Agent
Caller
100
Contact Center 130
Live Session 112
Caller 114
Network
120
SIV component 132
133
Agent Authentication 134
Agent
116
Agent Monitoring 136
Table 139
138
Agent
Speech Pattern
Jill Smith
Pattern AAA
Joe Smith
Pattern BBB
John Miller
Pattern CCC

FIG. 1

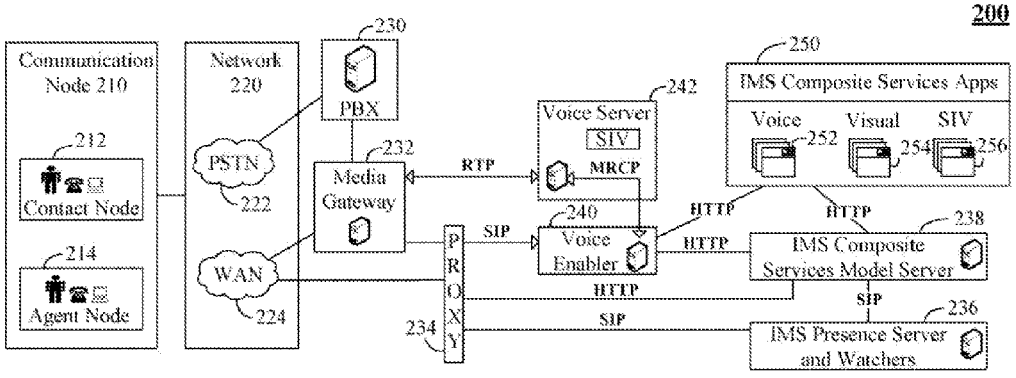
200
Communication
Node 210
212
Contact Node
214
Agent Node
Network
220
PSTN
222
WAN
224
230
PBX
232
Media
Gateway
RTP
Voice Server
SIV
MRCP
242
250
IMS Composite Services Apps
Voice
Visual
SIV
252
254
256
SIP
240
Voice
Enabler
HTTP
HTTP
HTTP
238
IMS Composite
Services Model Server
HTTP
SIP
SIP
236
IMS Presence Server
and Watchers
234
PROXY

FIG. 2

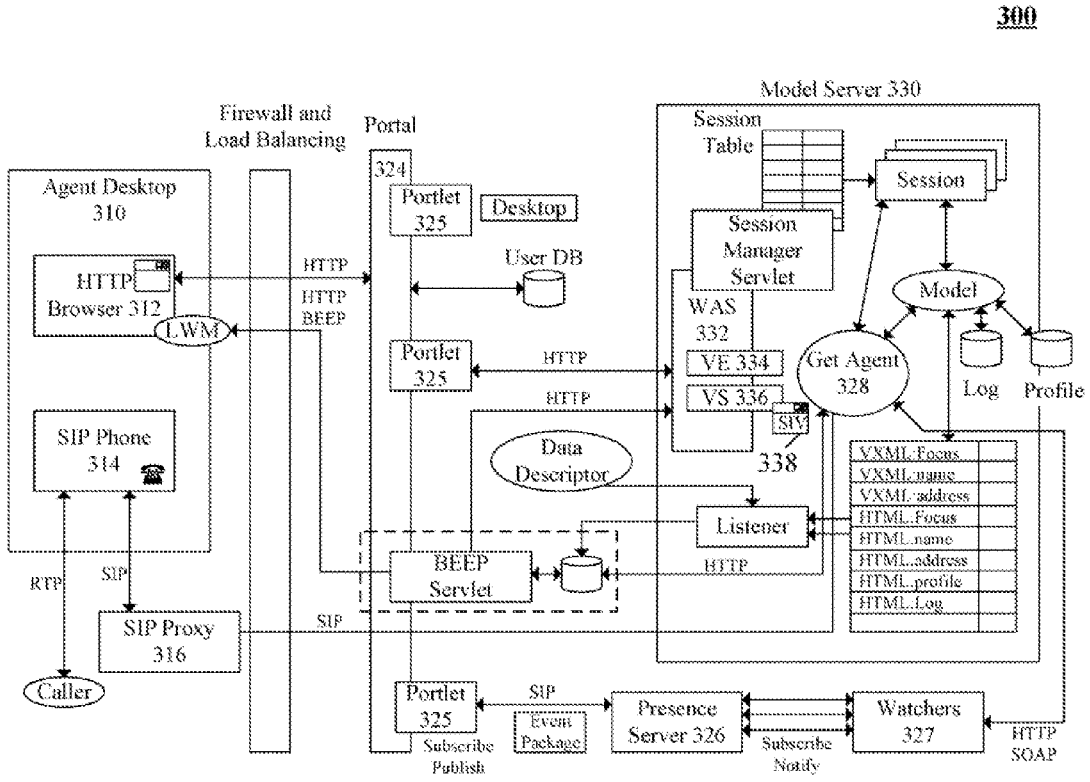
300
Model Server 330
Firewall and Load Balancing
Portal
324
Session Table
Agent Desktop 310
Portlet 325
Desktop
Session
Session Manager Servlet
HTTP Browser 312
HTTP
HTTP BEEP
LWM
User DB
Model
WAS 332
Portlet 325
HTTP
VE 334
Get Agent 328
Log
Profile
HTTP
VS 336
SIP Phone 314
Data Descriptor
338
VXML:Focus
VXML:name
VXML:address
HTML:Focus
HTML:name
HTML:address
HTML:profile
HTML:Log
Listener
RTP
SIP
BEEP Servlet
HTTP
SIP Proxy 316
SIP
Caller
Portlet 325
SIP
Event Package
Presence Server 326
Watchers 327
Subscribe
Publish
Subscribe
Notify
HTTP
SOAP

FIG. 3

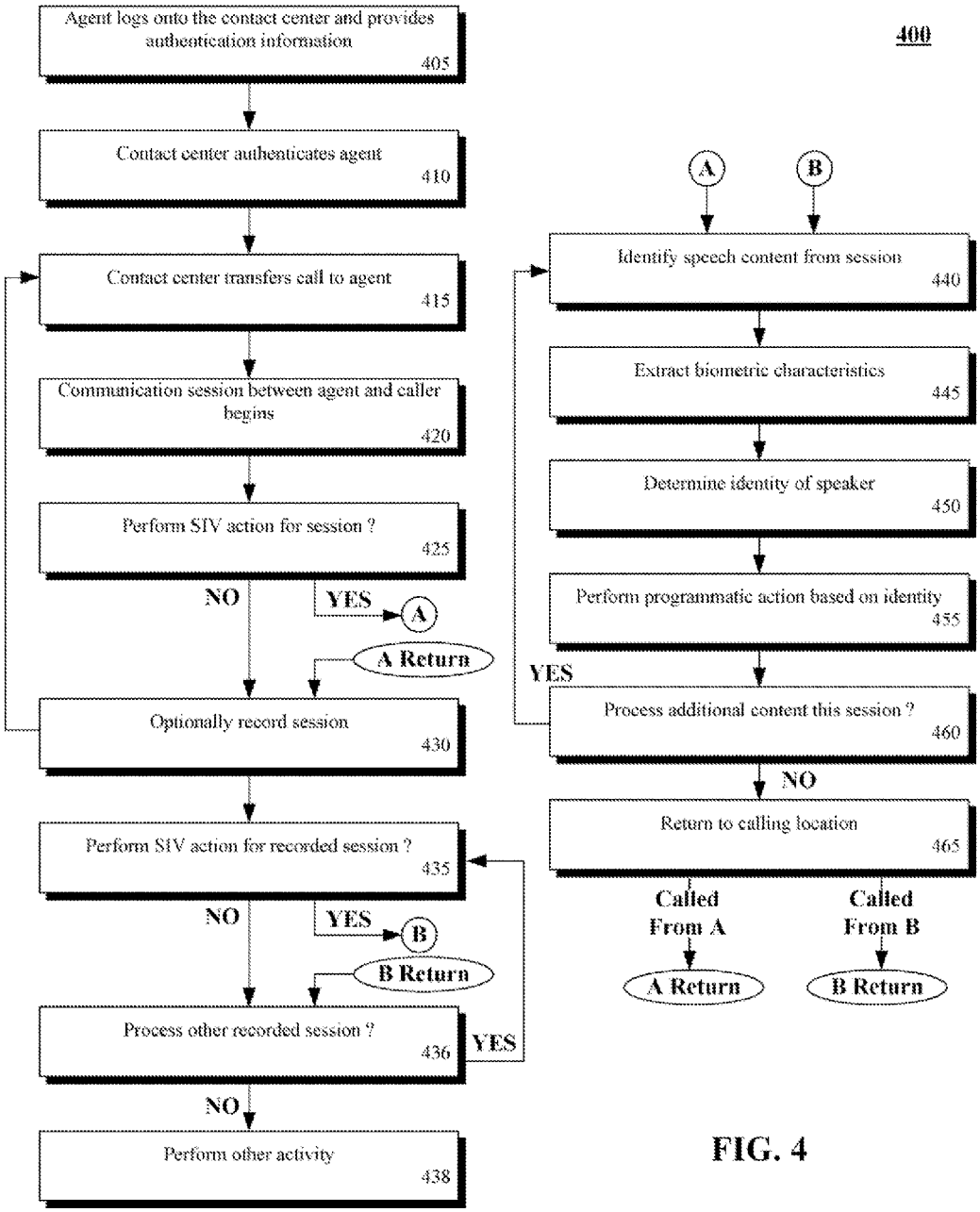
400
Agent logs onto the contact center and provides authentication information
405
Contact center authenticates agent
410
Contact center transfers call to agent
415
Communication session between agent and caller begins
420
Perform SIV action for session ?
425
NO
YES
A
A Return
Optionally record session
430
Perform SIV action for recorded session ?
435
NO
YES
B
B Return
Process other recorded session ?
436
YES
NO
Perform other activity
438
A
B
Identify speech content from session
440
Extract biometric characteristics
445
Determine identity of speaker
450
Perform programmatic action based on identity
455
YES
Process additional content this session ?
460
NO
Return to calling location
465
Called From A
Called From B
A Return
B Return

FIG. 4

IDENTIFYING CONTACT CENTER AGENTS BASED UPON BIOMETRIC CHARACTERISTICS OF AN AGENT'S SPEECH

CROSS-REFERENCE TO RELATED APPLICATIONS

This continuation-in-part application claims the benefit of U.S. patent application Ser. No. 11/680,304 filed 28 Feb. 2007, which is hereby incorporated by reference herein.

BACKGROUND

1. Field of the Invention

The present invention relates to the field of contact center technologies and, more particularly, identifying contact center agents based upon biometric characteristics of an agent's speech

2. Description of the Related Art

Historically, contact center agents have been placed in operations centers where they work along side many other contact center agents. Each agent has operated from an agent-specific desktop, which includes a data terminal and phone connection. Contact center agents have been identified based upon a user name and password combination and/or based upon an identifier of a device (e.g., phone or terminal) used by the agent.

Conventionally, front end software that drives the agent desktop has been part of a vendor-specific solution that connects the agent to contact center backend components, which are also vendor-specific. The protocols, hardware, and software used by the different vendors have historically been incompatible with one another, requiring all contact center components to be those of a single vendor.

In a related application (U.S. patent application Ser. No. 11/680,304 entitled "IMPLEMENTING A CONTACT CENTER USING OPEN STANDARDS AND NON-PROPRIETARY COMPONENTS"), Applicants have disclosed an open contact center which describes a technique for implementing a contact center based upon open standards, which are independent upon any specific vendor. An open contact center permits interactions to occur using standard hardware and software devices. For example, an agent can interact with contact center components using standard telecommunication devices, such as a SIP based phone and/or a HTTP based browser. Use of standards based hardware can permit contact center agents to work outside a centralized operations center. That is, in an open contact center environment, contact center agents can seamlessly work from remote locations, such as from their home or from geographically separated small office locations. Basically, agents of an open contact center would be able to work from any location so long as a network connection exists that permits them to communicate with the open contact center backend system.

Further, use of open standards within a contact center combined with an ability to integrate geographically distributed agents can create an opportunity for independent knowledge brokers to sell their services to one or more contact centers. For example, a doctor, lawyer, computer technician, and the like, can work from their own office and sell their services by the hour to many different contact centers. These contact centers benefit because they do not have to employ skilled agent on a full time basis, but can instead dynamically obtain services of the independent knowledge brokers as needed. Customers benefit as well by being granted access to a large pool of skilled professionals. Knowledge brokers are provided with a new competitive market in which they can sell their skills.

Conventional agent identifying techniques lack a fraud resistant means of identifying an agent. That is, basing agent identity solely on a user name or device identity (i.e., conventional identification techniques) can be easily spoofed by dishonest agents. For example, an agent could initially authenticate themselves with a contact center and then substitute a representative to handle calls in their place. Callers, and/or the call center would remain unaware of the substitution, which could result in an unqualified or untrained call center agent handling customer issues. Further, a contact center could be paying a premium for an agent believed to have exceptional skills, when in fact a substitute, who would normally be paid at a lower rate, is handling calls.

SUMMARY OF THE INVENTION

The present invention identifies contact center agents based upon biometric characteristics of an agent's speech. More specifically, recorded and/or live contact center communications can be speech processed using speaker identify verification (SIV) techniques. The contact center can be implemented using standardized components and protocols, which permit agents to use a front end interface (e.g., a HTTP browser and/or a SIP phone) connected to backend contact components over a standard network. In one embodiment, the contact center components can be vendor independent, Service Oriented Architecture (SOA) components.

The SIV techniques can be advantageously used in the context of a contact center in many different manners. For example, during agent authorization, the agent can be required to speak a phrase, which is analyzed (e.g., voice print analysis) to ensure that the speaker is the intended agent instead of another individual using the agent's hardware and/or password. During contact center communication sessions, agent speech can be repetitively sampled to ensure that a substitute has not replaced the contact center agent who is intended to handle the caller issues.

In another example, SIV techniques can be used to automatically distinguish a caller's utterances from those of a contact center agent. One use of this technique is to automatically determine if an inappropriate phrase, such as cursing, was uttered by an agent (who can be disciplined for cursing) or a caller. Another use can be to increase speaker identification accuracy for transcription purposes.

The present invention can be implemented in accordance with numerous aspects consistent with the material presented herein. For example, one aspect of the present invention can include a contact center including a set of contact center components and a SIV component. The contact center components can provide automated interactive communications with callers, can provide queue management for callers waiting to communicate with live agents, and can provide skills based routing for assigning lie agents to callers. The SIV component can analyze speech utterances to determine a speaker identify based upon biometric characteristics of the analyzed speech utterances. Additionally, the SIV component can process speech from contact center sessions to automatically identify at least one contact center agent involved in each of the contact center sessions. In one embodiment, the SIV component can be repetitively used to prevent agent substitutions from occurring of which the call center is unaware. In another embodiment, the SIV component can be used to distinguish whether communication session content was spoken by a contact center agent or a caller. Speaker

determination can be important for transcriptions, for detecting an origin of inappropriate phrases (e.g., cursing), and other purposes.

Another aspect of the present invention can include a contact center, which includes an agent desktop, a portal server, an application server, and a SIV component. The agent desktop can include a standard Hypertext Transfer Protocol (HTTP) based browser and a standard phone. The agent desktop can permit an agent to handle call center communications. The portal server can provide an agent portal, through which the agent utilizing the agent desktop communicates. The agent portal can include a set of agent portlets within which contact center information is presented. The application server can execute contact center applications and can be configured to receive input for the contact center applications from the agent portlets and to present contact center output through the agent portlets.

Still another aspect of the present invention can include a method for identifying contact center agents based upon voice characteristics. In the method, a contact center can receive speech content that is associated with a communication session involving a contact center agent. Biometric characteristics can be extracted from the speech content. These extracted biometric characteristics can be compared against previously stored biometric characteristics associated with at least one contact center agent. Results of this comparison can be used to determine an identify of a speaker of the speech content. These extracted biometric characteristics can be compared against previously stored biometric characteristics associated with at least one contact center agent. Results of this comparison can be used to determine an identify of a speaker of the speech content. The contact center can then perform at least one programmatic action based upon results of the determined identity.

It should be noted that various aspects of the invention can be implemented as a program for controlling computing equipment to implement the functions described herein, or as a program for enabling computing equipment to perform processes corresponding to the steps disclosed herein. This program may be provided by storing the program in a magnetic disk, an optical disk, a semiconductor memory, or any other recording medium. The program can also be provided as a digitally encoded signal conveyed via a carrier wave. The described program can be a single program or can be implemented as multiple subprograms, each of which interact within a single computing device or interact in a distributed fashion across a network space.

It should also be noted that the methods detailed herein can also be methods performed at least in part by a service agent and/or a machine manipulated by a service agent in response to a service request.

BRIEF DESCRIPTION OF THE DRAWINGS

There are shown in the drawings, embodiment which are presently preferred, it being understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

FIG. **1** is a schematic diagram of a system in which a contact center uses speaker identify verification (SIV) techniques to identify contact center agents in accordance with an embodiment of the inventive arrangements disclosed herein.

FIG. **2** is a schematic diagram of a system for implementing an open contact center that includes SIV capabilities in accordance with an embodiment of the inventive arrangements disclosed herein.

FIG. **3** is a schematic diagram of a standards based contact center having SIV capabilities shown from an agent perspective.

FIG. **4** is a flow chart of a method in which a contact center determines identity of a speaker based upon speech characteristics in accordance with an embodiment of the inventive arrangements disclosed herein.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** is a schematic diagram of a system **100** in which a contact center **130** uses speaker identify verification (SIV) techniques to identify contact center agents in accordance with an embodiment of the inventive arrangements disclosed herein. The contact center **130** can be a functional area used by one or more organizations to handle inbound/outbound communications with callers **114**. Callers **114** can be transferred from an automated response component of the call center **130** to available agents **116** based on the skills needed to handle the caller's issues and based upon expertise possessed by agent **116**. Thus, a live communication session **112** can be conducted between the caller **114** and contact center agent **116**. These sessions can be recorded **110** to be later analyzed by an agent monitoring component **136**.

The contact center **130** can include an SIV component **132**, which can automatically determine a speaker identify based on biometric information contained in speech waves. The SIV component **132** can be associated with one or more speaker identify applications **133** and/or one or more speaker verification applications **133**. Both types of applications **133** compare previously stored speech patterns and/or speech characteristics associated with a particular speaker (as shown by table **139** in data store **138**) with biometrics extracted form a speech sample.

A speaker identify application **133** can determine which registered speaker (e.g., a caller **114** or agent **116**) provides a given utterance during a session **110**, **112** and can use this information to perform a contact center **130** task. For example, a pattern matching algorithm can analyze session spoken phrases to determine if any inappropriate phrases, which can be defined using a configurable phrase list, were spoken. When these phrases were spoken by a caller **114** alone, the agent monitoring **136** component can reward an agent **116** for maintaining their composure and/or for professionally calming the caller **114** during a latter part of a contact center session **110**, **112**. When an inappropriate phrase is spoken by an agent **116** (as determined by the SIV component **132**) a corrective or punishing action can be taken by the agent monitoring component **136** to prevent future occurrences of these inappropriate phrases by that agent **116**.

A speaker verification application **133** can be configured to accept or reject an identify claim of a speaker, such as agent **116**. For example, an agent can initially be prompted by an agent authentication **134** component to provide identifying information. That is, during login, an agent can provide a user name and password combination, a device identifier for a used communication device, and/or a spoken phase that is analyzed by SIV component **132**. The agent authentication component **134** can intermittently verify that the authorized agent **116** who logged into the contact center **130** has not been replaced with a substitute. In other words, a speaker verification application **133** can execute code to determine if the logged agent **116** is participating in a session **110**, **112**. If not, corrective actions can be taken.

The SIV component **132** can utilize a variety of identify determining techniques to perform verification and/or identification tasks based upon speech segments. The SIV com-

ponent **132** can correlate identify with physiological and behavioral characteristics of the speaker. These characteristics exist both in the spectral envelope (e.g., vocal tract characteristics) and in the supra-segmental features (e.g., voice source characteristics and dynamic features spanning several segments). In one embodiment, the SIV component **132** can use Linear Predictive Coding (LPC)-derived cepstral coefficients and their regression coefficients for short-term spectral measurements. Further, the SIV component **132** can accommodate vocal variations of a speaker using a parameter domain normalization technique or a distance/similarly domain technique. The speaker identify technique used by SIV component **132** can be text dependent (e.g., using a dynamic time warping algorithm) or text independent (e.g., using a vector quantization algorithm). SIV component **132** is not to be construed as limited to any particular technique or technology, as any of a variety of techniques/technologies can be advantageously used by the contact center **130** in accordance with inventive details described herein.

The agent authentication component **134** can identify an agent and upon successful authentication can provide the agent with access to contact center **130** resources. For instance, an agent can login using a user id and password, which is submitted to the contact center using a Web interface. In one embodiment, the authentication function can be provided by WEBSPHERE Application Server (WAS) and Portal Server (PS) JAVA security facilities.

The agent monitoring component **136** can permit call center agents to be monitored for quality assurance or training from virtually any location. In one embodiment, the agent monitoring component **136** can be provided using the WEBSPHERE Portal Server (WPS) and a reporting component (not shown). For example, agent interactions can be viewed/analyzed using the reporting component for items such as average call handling time, number of calls handled per hours, etc. One of the supervisor's portlets in their Web browser can contain a view of the call center agents, along with access to the agent reporting database, which can include agent specific statistics. The supervisor portlet can permit a supervisor to access agent information from any Web browser, once the supervisor has been properly authenticated by the agent authentication component **134**. In one embodiment, real-time statistics can be provided by the agent monitoring component **136**, which can even permit the supervisor to silently conference into/observe a real-time agent/caller interaction. This conferencing may require use of additional functions of contact center **130**.

FIG. **2** is a schematic diagram of a system **200** for implementing an open contact center that includes SIV capabilities in accordance with an embodiment of the inventive arrangements disclosed herein. The system **200** can represent one contemplated embodiment of system **100**. As defined herein, an open contact center includes components that interact based upon open standards. Use of open standards indicates that specifics of communication protocols, interfaces with components of the open contact center, and the like, are published and available to third party vendors who can construct solutions or enhancements to the open contact center by conforming to the published standards. Open standards can include, but are not limited to, Extensible Markup Language (XML) based standards, service-oriented architecture (SOA) based standards, Real-time Transport Protocol (RTP) based standards, Media Resource Control Protocol (MRCP) based standards, Hyper Text Transfer Protocol (HTTP) based standards, Session Initiation Protocol (SIP) based standards, and the like. Open standards are often established by an independent standard setting body, such as the Internet Engineering Task Force (IETF), World Wide Web Consortium (W3C), etc., or by a cooperating consortium of multiple independent businesses, such as IBM, Sun Microsystems, and the like. Open standards, as used herein, can exist even though one or more companies maintains intellectual property rights to open contact center concepts, such as those presented in the instant application.

In system **200**, a communication node **210** of a caller (e.g., contact node **212**) and/or an agent (e.g., agent node **214**) are linked to network **220**. Network **220** can include Public Switched Telephone Network (PSTN) components **222** and wide area network (WAN) **224** components. The PSTN **222** can interface with a Private Branch Exchange (PBX **230**) which routes calls to media gateway **232**. The media gateway **232** can interact with the voice server **242** and the voice enabler **240** using open standards, such as RTP based standards and MRCP based standards. Call provisioning applications (e.g., CCXML based applications) can be used for call provisioning (e.g., DNIS to VXML application) functions.

System **200** can utilize an IMS composite services model server **238** to handle IMS composite services applications **250**, which can replace single modality applications commonly used in legacy contact centers. The composite services applications **250** can include voice applications **252**, visual applications **254**, and SIV applications **256**. The contact node **212** and the agent node **214** can each interact with the contact center using many different modalities, such as voice, instant messaging, Web form interactions during sessions, and the like. Each communication node **210** can interface using standard hardware and software, such as a SIP phone and Web browser with LOTUS Lightweight Messaging (LWM) and Blocks Extensible Exchange Protocol (BEEP). Asynchronous JavaScript and XML (AJAX) and HTTP or other communication techniques for exchanging information with the agent node **214** can be used in place of LWM and BEEP. WEBSPHERE PS and agent portlets can be used to interface with the Web browser for added scalability and security.

IMS presence server and watchers **236** can be used in system **200** to detect available agents and their skills and to monitor contact center interactions. In one embodiment, collaboration components can be implemented using IBM WORKPLACE or other such components. The voice enabler **240** can be implemented using IBM's VOICE ENABLER, the voice server **242** can be implemented using WEBSPHERE voice server, and the proxy **234** can be implemented using WAS EDGE SERVER LOAD BALANCER or WAS SIP PROXY.

It should again be emphasized that although component implementation specifics for one contemplated embodiment have been described using IBM WEBSPHERE middleware, the invention is not so limited. Any middleware solution or standards based solution can be used in place of the IBM WEBSPHERE specific component described herein, using adaptations and software techniques commonly performed by software engineers and developers, which do not require undue experimentations or inventive efforts. For example, WEBSPHERE components can be replaced by components from a different software platform, such as BEA WEBLOGIC application server from BEA Systems, Inc. of San Jose, Calif., a JBOSS application server from JBoss, Inc. of Atlanta, Ga., a JOnAS application server from the ObjectWeb Consortium, the .NET software platform, and the like.

FIG. **3** is a schematic diagram of a standards based contact center **300** having SIV capabilities shown from an agent perspective. Center **300** represents one particular embodiment for system **100**. Specific components of center **300** are

implemented using WEBSPHERE enabled components and associated tooling. It should be noted that center **300** utilizes WEBSPHERE enabled components for illustrative purposes only and the scope of the invention is not to be construed as limited in this regard. Other middleware solutions and standards based solutions can be substituted and adapted to achieve approximately equivalent results.

As illustrative scenario for center **300** can show how the components interact. In this scenario, a call can come in over a telephone to the contact center **300** using a standard telephone, where the call is transferred to an agent connected to contact center components using agent desktop **310**. The agent can utilize any personal computer in an operations center as the agent desktop **310** and is not constrained to a particular station. The agent can also remotely (i.e., external to an operations center, such as through a home computer) connect to contact center components using a Web browser **312** and SIP based telephone **314**. The agent can sign onto portal **324** via an agent desktop portlet **325**. For example, the agent can enter a user id and password and hit a SUBMIT button.

The desktop agent **310** portlet can call the WEBSPHERE PRESENCE SERVER (WPS) **326** with a publish/subscribe mechanism. An IP address of the agent's SIP phone **314**, browser **312**, BEEP address, and other information including agent expertise and agent utilization can be conveyed to the presence server **326**. After login onto the system, a default screen can be presented in the browser **312** that indicates that the agent is active and available.

At this time, a call between a caller on a phone and the contact center **300** can be active. In a running VXML application, the WEBSPHERE Voice Enabler (VE) **334** can prompt a user for input. The BE **334** can interact with the voice server (VS) **336** to determine user context information and a purpose of a call. The caller responses can indicate that agent assistance is needed. For example, a caller can select a dialog option to speak with a live agent. The VXML application can transfer the caller to an agent transfer servlet co-located with the SIP proxy **316**. The transfer can be conducted using a get agent **328** function, which uses one or more expertise specific watchers **327** to detect a suitable agent having a caller needed expertise. Presence information of the agents and caller can be managed by presence server **326**. Once the transfer is made, the agent can receive the call using the SIP phone **314** and can receive caller specific data via the browser **312**.

During or after (i.e., the session can be recorded and later analyzed) the communication session, one or more SIV applications **338** can execute within the voice server **336**. For example, one SIV application **338** can verify that the individual using the agent desktop **310** is the agent who is supposed to be handling the call and is not a substitute. In another example, the SIV application **338** can be used to determine whether a spoken comment during the communication session was made by an agent or by a caller.

FIG. **4** is a flow chart of a method **400** in which a contact center determines identify of a speaker based upon speech characteristics in accordance with an embodiment of the inventive arrangements disclosed herein. Method **400** can be performed in the context of a system **100** or other contact center system.

Method **400** can begin in step **405**, where an agent logs onto a contact center by providing authentication information. The authentication information can include a user name and password, one or more device identifiers, and/or speech input which is processed by a SIV component. In step **410**, the contact center can authorize the agent. Backend contact center components, such as a presence server and associated watchers, can be updated to indicate that the authorized agent is now available to handle caller communications.

In step **415**, the contact center can transfer a call to the agent. The caller can be placed in a waiting queue (not shown) if the agent is busy handling another caller. A communication session between the caller and the agent can begin in step **420**. In step **425**, a determination can be made as to whether a SIV action is to be performed for the session. In one embodiment, this can be a real-time SIV action, which can trigger a programmatic action that affects the active session. When no SIV action is to be performed in step **425**, the method can proceed to optional step **430**, where the session can be provided. The method can loop from step **430** to step **415**, where another caller can be transferred to the contact center agent.

In asynchronous step **435**, a determination can be made to perform an SIV action involving the recorded session. When no SIV action is to be performed against the recorded session in step **435**, the method can proceed to step **436**, where other recorded sessions can be optionally analyzed. The method loops from step **436** to step **435** when another recording is to be processed using an SIV technique. When all recordings have been analyzed, the method can proceed to step **438**, where other activities can be performed, or where the method can end.

When one or more SIV actions are to be performed in either step **425** or step **435**, the method can progress to step **440**, where a portion of speech content from the communication session can be identified. In step **445**, biometric characteristics of a speaker can be extracted from the identified speech content. In step **450**, a speaker identify can be determined from the extracted biometrics. For example, a voice print analysis can indicate that the speech context was spoken by a contact center agent. In step **455**, a programmatic action can be initiated based upon the determined identify. For example, if the speech content confirms or verifies the identify of a contact agent is proper, that agent can be credited for the transaction by a payroll program. In another example, the speech content can include inappropriate phrases (e.g., curses) and corrective or punishment actions can be taken against an agent should the agent be the individual who spoke the inappropriate phrases. In step **460**, a determination can be made as to whether further speech content for the session is to be processed. If so, the method can loop to step **440**. When all desired content has been processed, the method can proceed to step **465**, where the method can return execution to the original processing point. That is, when the original exit was from step **425**, the method can proceed from step **465** to step **430** and when the original exit was from step **435**, the method can proceed from step **465** to step **436**.

The present invention may be realized in hardware, software, or a combination of hardware and software. The present invention may be realized in a centralized fashion in one computer system or in a distributed fashion where different elements are spread across several interconnected computer systems. Any kind of computer system or other apparatus adapted for carrying out the methods described herein is suited. A typical combination of hardware and software may be a general purpose computer system with a computer program that, when being loaded and executed, controls the computer system such that it carries out the methods described herein.

The present invention also may be embedded in a computer program product, which comprises all the features enabling the implementation of the methods described herein, and which when loaded in a computer system is able to carry out these methods. Computer program in the present context

means any expression, in any language, code or notation, of a set of instructions intended to cause a system having an information processing capability to perform a particular function either directly or after either or both of the following: a) conversion to another language, code or notation; b) reproduction in a different material form.

This invention may be embodied in other forms without departing from the spirit or essential attributes thereof. Accordingly, reference should be made to the following claims, rather than to the foregoing specification, as indicating the scope of the invention.

What is claimed is:

1. A contact center comprising:

the contact center configured to provide automated interactive communications with callers, providing queue management for callers waiting to communicate with live human agents, and providing skills based routing for assigning live human agents to callers; and

a speech identification and verification (SIV) component configured to analyze speech utterances and configured to determine a speaker identity based upon biometric characteristics of the analyzed speech utterances, wherein said SIV component processes speech from contact center sessions that are each between a caller and a human agent to automatically identify the human agent of the contact center involved in each of the contact center sessions based on the biometric characteristics of the speech utterances of that human agent, wherein said SIV component determines whether the human agent that logged into the contact center with a user identifier uniquely assigned to the human agent is indeed the human agent involved in the contact center sessions.

2. The contact center of claim **1**, wherein a use of the SIV component prevents agent substitutions from occurring of which the call center is unaware, wherein substitutions for which prevention occurs are each a substation where a human who is not the human agent substitute for the human agent by using the user identifier and password of the human agent.

3. The contact center of claim **1**, further comprising:

speech processing components that automatically convert the speech utterances to text, which is further processed by software stored in a machine readable medium, wherein results of the further processing is used by the contact center, wherein the speech identification and verification (SIV) component is used to distinguish which of the human agent and the caller spoke particular ones of the analyzed speech utterances during each one of the contact center sessions, wherein the converted text is linked to a speaker of content of the converted text based upon results produced by the SIV component.

4. The contact center of claim **1**, further comprising:

an agent desktop comprising an HTTP browser and a SIP based phone each based upon open standard, wherein the agent desktop is configured to operate as an interface between the contact center agents and the contact center.

5. The contact center of claim **1**, further comprising:

a portal server configured to provide an agent portal, through which the contact center agents communicate, said agent portal including a plurality of agent portlets within which contact center information is presented; and

a standards based Web browser within which the agent portal is presented, wherein the Web browser is part of an agent desktop that is configured to operate as an interface between the contact center agents and the contact center.

6. The contact center of claim **1**, further comprising:

a plurality of contact center components conforming to open standards that intercommunicate utilizing open standards, said components together forming the contact center.

7. The contact center of claim **6**, wherein each of the contact center components execute within a middleware solution having IP Multimedia Subsystem (IMS) capabilities.

8. The contact center of claim **6**, wherein each of the contact center components are service oriented architecture (S OA) components.

9. A method for contact centers to identify contact center agents based upon voice characteristics of the human agents comprising:

a human agent logging onto a contact center and providing authentication information that includes a user name unique to that human agent and a corresponding password for the user name;

the contact center authenticating the agent using the authentication information;

the call center transferring a caller to the human agent to initiate a contact center communication session between the human agent and the caller;

receiving speech content associated with the contact center communication session;

extracting biometric characteristics contained within the speech content of the contact center communication session;

comparing the extracted biometric characteristics against previously stored biometric characteristics associated with the human agent;

determining an identity of a speaker of the content based upon results of the comparing step;

comparing the identity of the speaker with an identity of a human associated with the user name, wherein the comparison is performed to verify that a human logged in as the human agent via the user name is in fact the speaker;

a contact center performing at least one programmatic action based upon results of the determined identity, wherein the programmatic action is determining whether inappropriate phrases spoken during the communication session were attributable to the human agent or to the caller and taking corrective or punishment actions against the human agent when the human agent is determined to have spoken the inappropriate phrases.

10. The method of claim **9**, wherein said contact center communication session includes speech of the human agent and a contact center customer, and wherein said received speech content is a segment of speech provided by the human agent and the contact center customer, said determining step further comprising:

determining utilizing a software program stored in a machine readable memory which one of the human agent and the contact center customer provided said speech content, wherein said determined identity is one of the human agent and the contact center customer.

11. The method of claim **10**, further comprising:

speech-to-text converting said received speech content;

matching converted text with a previously defined entry in a set of watched words; and

based upon said matching step, triggering the determining step, wherein said programmatic action is at least one of an agent monitoring action, a supervisor notification action, a supervisor conferencing action, and a programmatic action that changes a performance rating associated with the contact center agent.

12. The method of claim 10, further comprising:

automatically transcribing the speech of the contact center communication session, wherein different speakers are indicated based upon results of the determining step.

13. The method of claim 9, wherein the programmatic action is an agent verification action, said method further comprising:

verifying that the identity matches an identity of a contact agent to whom the contact center directed a caller for live interactions during the communication session.

14. The method of claim 9, further comprising:

automatically converting the speech content to text; and

adding speaker identifying text to the converted text that indicates which of the contact center agent and a caller provided the associated converted text, wherein the added speaker identifying text is based on results of the determining step.

15. The method of claim 9, wherein the programmatic action verifies whether or not the a human logged in as the human agent via the user name is in fact the human agent or is a different human substituting for the human agent.

16. The method of claim 9, wherein the steps of claim 9 are performed by a plurality of contact center components conforming to open standards that intercommunicate utilizing open standards, said components together forming the open contact center, said contact center providing automated interactive communications with callers, providing queue management for callers waiting to communicate with call center agents, providing skills based routing for assigning live agents to callers based upon skills of the live agents and skills needed by the callers, and providing tooling for provisioning and monitoring the contact center agents.

17. The method of claim 9, wherein the programmatic action determines whether inappropriate phrases spoken during the communication session were attributable to the human agent or where attributable to the caller, wherein the programmatic action takes corrective or punishment actions against the human agent when the human agent is determined to have spoken the inappropriate phrases, and wherein the program action does not take corrective or punishment actions against the human caller when the caller is determined to have spoken the inappropriate phrases.

18. A contact center comprising:

an agent desktop comprising a standard HTTP browser and a standard phone, wherein the agent desktop is configured to permit a human agent to handle call center communications;

a portal server configured to provide an agent portal, through which the human agent utilizing the agent desktop communicates, said agent portal including a plurality of agent portlets within which contact center information is presented, wherein a speech identification and verification (SIV) component determines whether the human agent that logged into the contact center with a user identifier uniquely assigned to the human agent is indeed the human agent involved in the contact center sessions;

an application server executing contact center applications configured to receive input for the contact center applications from the agent portlets and to present contact center output through the agent portlets; and

the SIV component configured to analyze speech utterances and configured to determine a speaker identity based upon biometric characteristics of the analyzed speech utterances, wherein said SIV component processes speech from contact center sessions to automatically identify whether a segment of speech content spoken during a contact center session between a caller and a human using the agent desktop, was spoken by the human agent of the contact center or not based upon comparing biometric characteristics of the segment of speech content with previously stored biometric characteristics of the human agent, wherein said SIV component determines whether the human agent that logged into the contact center is the human agent involved in the contact center sessions.

19. The contact center of claim 18, wherein communications between the agent desktop and that contact center conform to open standards, said open standards consisting of a hypertext transfer protocol (HTTP) based standard and a Session Initiation Protocol (SIP) based standard.

20. The contact center of claim 18, wherein the software and hardware of the contact center is based upon industry standards, wherein the interfaces and communication protocols for the contact center use open standards, and wherein the contact center has IP Multimedia Subsystem (IMS) capabilities.

* * * * *